
Technical Specification For Electric Actuators For Motorized Valves

Contents

1	DESIGN AND CONSTRUCTION REQUIREMENTS.....	2
1.1	GENERAL.....	2
1.2	ELECTRIC MOTORS	2
1.3	SIZING.....	2
1.4	LIMIT AND TORQUE MONITORING	2
1.5	DIAGNOSIS	2
1.6	MOTOR AND LOCAL CONTROLS	2
1.7	ANTI-CONDENSATION HEATER	2
1.8	ENCLOSURES.....	2
1.9	HAND WHEEL	2
1.10	BEARINGS AND GEARS	2
1.11	NOISE LEVEL.....	2
1.12	NAME PLATES	2
1.13	PAINTING AND CORROSION PROTECTION	2
1.14	INSPECTION AND TESTING AT MANUFACTURER'S WORK	2
1.15	Documentation.....	2

1 Design Requirements

1.1 General

Actuators shall be designed for valve operation to ensure proper function in accordance to EN 15714-2:2010 electric actuators for industrial valves - basic requirements. Depending on application actuators shall be designed for ON-OFF, short-time duty (S2-15min) respectively Class A and B according to EN 15714-2 or MODULATING, intermittent duty (S4-25%) respectively Class C with up to 1.200 starts per hour; no. of starts depending on actuator size and output speed.

Actuator shall have a design life of 10.000 OPEN-CLOSE-OPEN cycles, each consisting of 30 turns per sense of rotation and must be suitable for operating in any mounting position. Actuator design must provide simple setting, testing, maintenance and repair.

Actuator settings shall be performed non intrusive via push-buttons at motor control without special tools or instruments (e.g. battery backed setting tool). A wireless Bluetooth interface shall be available. Microsoft Windows™ based software running on a conventional computer shall be available to allow actuator set-up and diagnoses.

Electrical connection of actuators to be multi pin plug and socket connector, allowing quick disconnection in case of maintenance or repair. In order to prevent loss of screws during commissioning or maintenance, all covers shall be fixed with captive screws. In order to minimize the amount of spare parts required, parts such as covers, plug and sockets, parts must be interchangeable throughout all model sizes.

Torque-transmitting housings must be made of cast iron, except motor housing. No plastic parts of any type shall be used, except for electric / electronic components, operating knobs / levers, indicator mechanism and sealing elements as far as applicable.

Depending on valve application, actuators shall be self-locking. Self-locking shall remain active if actuator is switched to hand-operation-mode. For non self locking actuators with high output speeds a mechanical anti-back drive device shall be provided attached to the actuator.

Valve mounting dimensions shall be according to ISO 5210 with use of a plug sleeve connection adapting to valve shaft. For rising stem applications, actuator design must allow actuator removal from output drive without disturbing the valve function.

1.2 Electric motors

Motors must be suitable for operating at 3 phase power supply voltage of 415Volt AC (+/- 10%), 50Hz (+/- 2%) and shall be specifically designed for valve-actuator operation, characterized by high starting torque, low stall torque and low inertia. Motors shall be totally enclosed non ventilated type (TENV). Motor housings and covers to be made of sea water resistant aluminum. Motor-insulation must be in accordance with IEC 85 Class F (155° C). Motors must be protected by 3 thermal monitoring devices, which are embedded in motor windings. Motor connections shall be internal by means of plug and socket.

Motors must be totally separated from lubricant-filled gearing of actuator, allowing replacement of motor without loss of lubricant regardless of mounting position. Motors shall have a dog coupling as mechanical connection to actuators worm shaft.

Actuator motors must develop full torque when power is turned on. All motors shall be of high starting torque type to facilitate 'unseating' of the valve. Each motor shall have a rating plate marked in accordance with IEC 34.1 as far as applicable.

1.3 Sizing

One actuator size (same outside dimensions) shall be available covering output speeds from 4 to 180 rpm for a given torque range, to avoid over sizing and unnecessary weight load on valve stem, flange and yoke. An increase of actuator size caused by higher actuator output speed is not acceptable to avoid weight over sizing of actuators. Actuators must be selected to provide sufficient torque required for safe valve operation. Actuator output torque must be available at 90 % of nominal voltage.

In order to enable proper sizing of applicable electric equipment, actuator supplier has to disclose current value at maximum setting torque. Actuator shall be capable of opening and closing the valve against full differential pressure within specified time on valve data sheet.

1.4 Limit and Torque Monitoring

No battery backed limit sensing shall be used to avoid actuator malfunction in case of power failure. Actuators shall have a hall sensor principle based absolute encoder for limit sensing with a resolution of 3° or better. Actuator shall not be equipped with a battery.

Torque sensing shall be of mechanical sliding worm principle with torque values independently settable for 'OPEN' and 'CLOSE' direction. No electronic torque sensing derived from motor current or piezo-electric torque sensing at worm shaft. Torque setting shall be possible for 40% to 100% of rated torque.

1.5 Diagnosis

Actuators installed in critical applications, shall be optionally equipped with a sensor package, consisting of torque, temperature and vibration diagnosis. In this case actuators shall also have a real time clock for event recording to support asset management functions and life cycle analysis. Display indications shall follow NAMUR recommendations with simplified status indications, operation log and torque curves.

1.6 Motor and local controls

Integral motor controls shall be microprocessor based and include mechanically and electrically interlocked reversing contactors for ON-OFF duty and solid state contacts (thyristors) for MODULATING duty actuators.

Local controls shall consist of motor controls, push buttons OPEN-STOP-CLOSE-RESET, lockable selector switch LOCAL-OFF-REMOTE and a wireless Bluetooth interface with separate indication showing wireless connection as active, as well as LCD graphic display clearly visible under all lighting conditions with plain text and in world languages, diagnosis symbols, graphs. Five indication lights, available in different color codes, showing status information such as end position open/close, torque fault in both directions and motor protection tripped.

Local controls shall be electrically attached to actuator via plug and socket connection. It shall be possible to re-position local controls at every 90°, so that push buttons and indication lights will face the operator.

In case actuators have to be mounted in difficult to access positions, it shall be possible to separate local controls (including motor controls) from actuator. A wall bracket shall be available to mount local controls / motor controls near valve actuator for distances up to 50 m cable length.

Depending on detailed project design, actuator version shall be as follows:

1. ON-OFF, short-time duty S2-15min with hard wired signals
OPEN-STOP-CLOSE, including a 4-20mA output signal, internally powered. Detailed wiring diagram to be supplied with submittal documents.
2. MODULATING, intermittent duty S4-25% with hard wired
communication via 4-20mA input signal, including a 4-20mA output signal, internally powered. Detailed wiring diagram to be supplied with submittal documents.

TECHNICAL SPECIFICATION FOR ELECTRIC ACTUATORS FOR MOTORIZED VALVES

Detailed wiring diagram shall show all relevant signals such as valve position, end positions (OPEN/CLOSE), selector switch position and high torque alarm in OPEN/CLOSE direction. In addition to this, actuator must provide a dedicated fault signal if there is a phase failure, motor protection tripped and/or high torque in OPEN/CLOSE direction or if hand wheel is engaged.

All control signals, communication signals as well as main power supply must be wired to a multi pin plug and socket for customer connection. Terminal compartment shall provide sufficient space to accommodate the possible maximum number of incoming wires. A minimum of three cable entries must be provided for motor power cable and digital/ analogue inputs and outputs. Each cable entry shall be properly sealed by cable glands during site installation. Cable glands shall be chosen by contractor, responsible for wiring during commissioning phase.

Each actuator shall provide an adequately sized internal and external connection for grounding.

1.7 Anti-condensation heater

In order to prevent condensation, a heater must be installed inside the actuator, suitable for continuous operation. Actuator must provide an alarm signal in case of failure of anti condensation heater.

1.8 Enclosures

Protection class of actuator, including motor, shall be IP 68, according to EN 60529 against submersion up to 8 m head of water for at least 96 hours. During submersion it must be possible to operate the actuator at least 10 times.

1.9 Hand wheel

Actuators must be equipped with a hand wheel for manual operation. Clockwise operation of hand wheel shall cause clockwise movement of output drive. Hand wheel shall be clearly marked with an arrow and the word 'CLOSE'.

Hand wheel engagement shall be of spring loaded push mechanism type and required manual declutching. Actuator must provide a switch signal when in manual mode.

Under manual operation, hand wheel shall drive the worm shaft. Self locking shall be maintained in hand operation. Motor must be disengaged during manual operation. Hand wheel shall automatically disengage when the electric motor is energized.

Hand wheel must be sized allowing easy manual operation of output drive. The over torque indication shall be active in manual operation as well as motor operation, thus allowing a signal to be provided when the set-torque has been reached.

1.10 Bearings and gears

Bearings shall be of antifriction or self-lubricating type. Bearings shall not require any maintenance between general overhauls. Power gears shall be made from heat treated steel. Worm-wheels shall be made of bronze material. Actuator gear housing shall be filled with an adequate quantity of lubricant. Re-lubrication between general overhauls shall not be required.

1.11 Noise level

Under all operating conditions the noise level of actuators shall not exceed 75 dB(A) at 1 m.

1.12 Name plates

Two nameplates, made of aluminum, shall be attached to each actuator; one on the motor housing, showing all relevant motor data, one on the actuator housing showing all relevant actuator data. Special

TECHNICAL SPECIFICATION FOR ELECTRIC ACTUATORS FOR MOTORIZED VALVES

information, such as valve tag no., shall be shown if required. Nameplates shall be securely fixed to actuator and motor, so that they cannot be removed or scratched off during shipment, installation, operation or maintenance.

1.13 Painting and corrosion protection

Actuator corrosion protection shall fulfill the requirements of EN ISO 12944-2, classification of environments C4 with a specified salt spray test of 720h. Actuator painting must be performed in such a way, that no corrosion takes place under ambient conditions as specified. All outside screws or bolts shall be made of stainless steel (A2). Actuators shall be corrosion protected with a primer coating and a two layer powder coating consisting of an epoxy coating and a polyurethane top coating with a total film thickness of at least 140µm. Final color shall be silver grey similar to RAL 7037.

1.14 Inspection and Testing at Manufacturer's work

Each actuator shall be factory tested. Tests shall be performed in accordance with IEC standards as far as applicable. A final inspection record shall be supplied with each actuator showing general actuator data, nominal current, no load current, starting current, power factor at rated torque, output speed, torque setting, limit setting (turns/stroke), high voltage test, functional test (including all options) and visual test.

1.15 Documentation

Supplier to provide storage- installation- and operation instruction as well as electric wiring diagram, dimensional drawings and technical data sheet including motor data as per manufacturer standard.